

KIENWD TR2500



2m FM
SYNTHESIZED
HAND-HELD TRANSCEIVER
Model TR-2500



ser. # 2090670

INSTRUCTION MANUAL

INTRODUCTION

You are the owner of our newest product, the TR-2500 Transceiver. Please read this instruction manual carefully before placing your transceiver in service.

The unit has been carefully engineered and manufactured to rigid quality standards, and should give you satisfactory and dependable operation for many years.

AFTER UNPACKING;

Save the box and packing material in the event your unit needs to be transported for remote operation, maintenance, or service.

The following explicit definitions apply in this manual:

NOTE: If disregarded, inconvenience only, no risk of equipment damage or personal injury.

CAUTION: Equipment damage may occur, but not personal injury.

CAUTION: DO NOT CONNECT AN EXTERNAL DC SUPPLY DIRECTLY TO THE CHARGE TERMINAL. Use only the supplied charger unit, optional base stand ST-2, or mobile stand MS-1. Extensive damage will occur if this is disregarded.

CAUTION: DO NOT ATTEMPT TO MODIFY OR OTHERWISE TOUCH CMOS LSI CIRCUITS. Leave all service to a qualified, experienced technician.

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SPECIFICATIONS

[GENERAL]

Frequency Range	144.000 — 147.995 MHz
Memory Channels	10 CH
Mode	FM (F3)
Operating voltage.....	8.4 V DC \pm 25%
Power Requirement	8.4 V, 400 mA (Ni-Cd battery pack)
	9 V AA manganese or alkaline (not Ni-Cd) 6 pcs. battery case (option)
Back-up Power Requirement ..	BR-2325 Lithium battery
Current Drain.....	Less than 30mA in receive mode with no input signal
	Less than 800mA in HI transmit mode (at 8.4 V)
	Less than 400 mA in Low transmit mode (at 8.4 V)
	Less than 1 μ A for memory back-up
Grounding	Negative
Operating Temperature	- 20°C to + 50°C
Antenna Impedance.....	50 Ω
Semiconductors.....	Microcomputer 1
	ICs 6
	FET 1
	Transistors 49
	Diodes 45
	LCD 1
	LED 1
Dimensions	With Ni-Cd battery: 66(2.6)W \times 168(6.7)H \times 40(1.6)D mm(inch)
	With manganese battery: 66(2.6)W \times 176(7.0)H \times 40(1.6)D mm(inch)

Weight	With Ni-Cd battery: 540 g (1.2 lbs.)
	With manganese battery: 530 g (1.2 lbs.)

[TRANSMITTER]

RF Output Power.....	HI = 2.5 W
	LOW = 0.3 W approx.
Modulation.....	Variable reactance direct shift
Frequency Tolerance	Less than $\pm 20 \times 10^{-6}$
	(- 10°C ~ + 50°C)

Maximum Frequency

Deviation	\pm 5 kHz
Spurious Radiation	Less than - 60 dB

[RECEIVER]

Circuitry	Double conversion superheterodyne
Intermediate Frequency.....	1st IF = 10.7 MHz
	2nd IF = 455 kHz
Sensitivity.....	Better than 1 μ V for S/N 30 dB
	Less than 0.2 μ V for 12 dB SINAD
Pass-Band Width.....	More than 12 kHz (- 6 dB)
Selectivity	Less than 24 kHz (- 60 dB)
Spurious Response	Better than 50 dB
Squelch Sensitivity	Less than 0.25 μ V (threshold)
Audio Output Power	More than 400 mW (at 10% distortion and 8 Ω load)

Note: Circuit and ratings may change without notice due to developments in technology.

Section 1 PREPARATION FOR USE

ACCESSORIES

Carefully unpack your TR-2500 transceiver and check that it is supplied with the following accessories

Accessory	Part Numbers:
Rubber Flex Antenna	T90-0329-05
Ni-Cd Battery Pack	W09-0320-05
AC Charger	W09-0315-05
External Speaker Plug	E12-0401-05
External Mic Plug	E12-0001-05
Alignment Tool	W01-0406-04
MIC-SP Cover	F07-0836-04
Rubber Cap (A)	F19-0617-04
Rubber Cap (B)	F19-0618-04

BATTERY NOTE

The supplied battery pack is not charged at the factory.
Charge the pack for about 15 hours before use.

1. OPERATING TIME:

Normal operating time of TR-2500 is 110 minutes for 1 minute transmission and 3 minutes reception using Hi Power mode. The following illustration shows the voltage/power versus time characteristics.

2. BATTERY LOADING

To load the battery pack, slide the pack onto the transceiver until the catch engages ("clicks"). To change or remove the battery pack, press the release button and slide the pack off to the left.

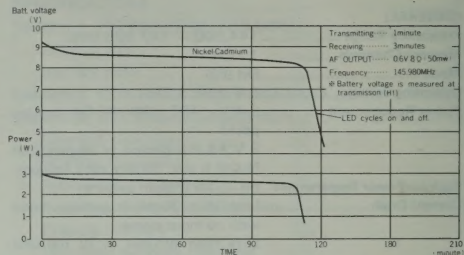


Fig. 1-1 Operating time

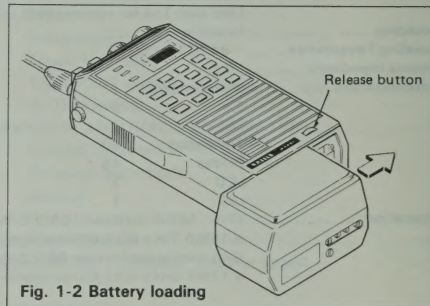


Fig. 1-2 Battery loading

3. CHARGING

When the battery LED indicator flashes on and off, the battery should be charged using the supplied AC wall charger.

Charger Note: LED indicates charger is delivery current to the battery pack. It does not indicate full charge. Disconnect after 15 hours charging time.

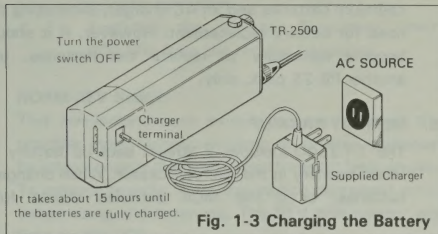
During charge with the supplied charger, DC power to the TR-2500 is automatically OFF, so the TR-2500 can not be operated. The battery may be charged using a MODEL MS-1 mobile stand or MODEL ST-2 base stand, available as optional accessories.

A fully charged battery will last for about 110 minutes when used at the rate or 1 minute transmission and 3 minutes reception (squelch ON, Hi Power.).

NOTE 1: The batteries will charge in 10 to 15 hours, depending on usage. We suggest you establish a charging schedule based on your personal operating habits. You may need to charge the pack every day, or only every other day. Experiment to determine your needs.

NOTE 2: To help you obtain long life from the battery pack do not always keep the cells "topped", or fully charged. They will develop what is known as a "memory". When you do not exercise NiCad's through normal charge-discharge cycles, they will not perform when needed. They will drain sooner, and may not recharge after heavy use. To insure good operation, EXERCISE the batteries.

NOTE 3: Use low power to obtain maximum operating time.



CAUTION: This is a **Charge terminal only**. Do not direct wire this terminal to an external power supply.

NOTE 1: The battery indicator will light momentarily when the power switch is turned off. This is not an indication that the battery is low.

NOTE 2: Battery Charge Time: Batteries will charge within 10 to 15 hours. That is, the radio is supplied with a 400mAh pack. Rule of thumb is charge at 1/10 the pack rating, for approximately 14 hours. Light discharge will require a shorter charge time.

CAUTION: When the batteries have been fully charged, do not attempt to continue charging. The batteries should be charged at temperatures of 0°C ~ 45°C.

4. BATTERY REPLACEMENT

The TR-2500 is supplied with rechargeable nickel-cadmium batteries and an AC charger, eliminating the need for battery replacement. However, if it should become necessary to replace the batteries, use another PB-25 pack, only.

5. MEMORY BACK-UP

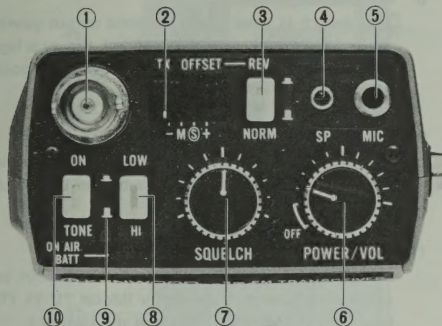
The TR-2500 includes a lithium back-up battery to retain memory in the microprocessor. When changing batteries, or if the NiCd batteries should fully

discharge, memory will always be retained. Back-up battery life is estimated at about 5 years.

6. MICROPROCESSOR RESET

If the display should, for some reason, display invalid numbers, simply reset the microprocessor. Momentarily press the reset microswitch accessible through the rear case. (All memories are erased in this case.) This may indicate the lithium battery needs replacement. This should be performed by an authorized Kenwood service facility—either a Kenwood dealer, or the factory.

Section 2 CONTROLS AND TERMINALS



1. Antenna Connector

Connect the supplied rubber-flex antenna with the BNC connector.

2. TX-OFFSET Switch

Shifts the transmit frequency for repeater operation.

“+”: Switches the transmit frequency up 600 kHz from the receive frequency.

“S”: Simplex (receive and transmit frequencies are the same).

“M”: The transmitter operates on a preset frequency in MEMORY channel O, while the receiver

frequency doesn't shift.

Any frequency can be preset in channel O for repeater operation.

“−”: Switches the transmit frequency down 600 kHz from the receive frequency.

3. NORM-REV Switch

This non-locking push switch is used to check the repeater input before switching to simplex operation by interchanging the receive and transmit frequencies. To operate reverse, keep this switch depressed while transmitting and receiving. The REV annunciator will light on the LCD.

4. SP Jack

To connect an earphone (EP-1), external speaker, or an SMC-25 SPEAKER/MIC.

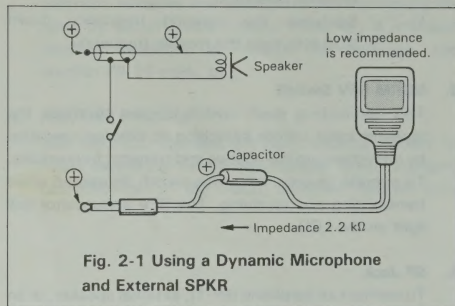
5. MIC Jack

Connect your external microphone using the supplied MIC plug.

NOTE 1: For direct connection of a condenser microphone. Input impedance is 2.2 k Ω and DC output is 4 V.

When a dynamic microphone is used, connect it through a capacitor (0.47 μ F ~ 1 μ F) to block DC voltage.

NOTE 2: If your microphone is equipped with a P.T.T. switch, connect it between the MIC and SPKR grounds.



6. Power Switch and Volume Control

Volume control with Power ON/OFF switch. Power is turned off at the full counterclockwise position.

7. SQL Control

Used to silence receive noise at no signal condition. Adjust clockwise until the noise threshold is reached when no signal is present. For scan operation, this control must be set to the threshold point.

8. HI/LOW Switch

This switch is used to set transmit output power to either 2.5 W (high) or 300 mW (low). Power is high at the normal out position (■), and is low at the position (■).

9. ON AIR/BATT Indicator

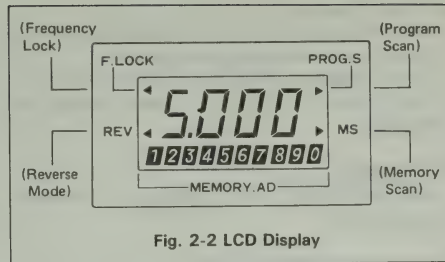
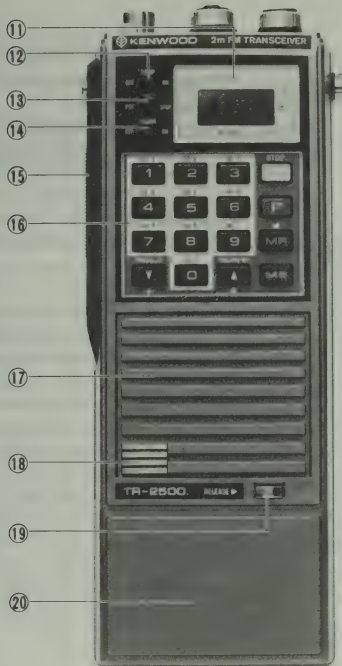
This LED (Light Emitting Diode) will indicate transmit mode. Low battery will indicate by the LED flashing ON and OFF.

10. TONE Switch

The switch is for activation of either the built-in, or an external optional tone generator (Model TU-1). (Tone frequency is preset to 100 Hz at the factory.)

11. LCD (liquid crystal Display) Panel

Displays frequency in 4 digits (for example, 146.940 MHz is displayed as 6940). Displays memory channel address numbers 0~9. The night lamp is controlled by the LAMP switch. Annunciators also indicate frequency lock, reverse, program scan and memory scan.



12. LAMP Switch

This switch controls the night lamp on the LCD panel. Observe the red flag at lamp ON.

NOTE: At LAMP switch ON battery drain will be accelerated. Do not use this feature unnecessarily.

13. TX Switch

Place this switch to STOP and the transceiver will not transmit. Use this feature when carrying the transceiver.

14. F. LOCK Switch

Place this switch ON and the displayed frequency will remain unchanged by keyboard operation.

The F. LOCK annunciator will light on the LCD.



This feature is convenient when carrying the transceiver.



15. PTT Switch


For transmission, press this switch and speak into the microphone.

16. Key Board Switches

(refer to "Key Board Operation"):


 ~  **Set Key:**


Used to preset operating frequencies and channels to be memorized (refer to ,  Keys).



 **Clear/Stop Key:**


By pressing this key, the preset frequency goes off and 5000 (145.000 MHz) is displayed.





When this key is pressed during Memory or Program scan, scanning stops.







 **Function Key:**

Used to store and erase the memory with the  key, to preset the scan width and scan step for program scan with


the  key, and to program scan (busy stop) with the  key.

 **(Memory/Memory Recall) Key:**

Press the  key and then the  key. All stored memory address channel numbers are displayed on the LCD. (At initial condition, no channel address numbers are displayed.) Press the desired set key ( ~ ). The frequency displayed will be memorized in that channel and the channel number displayed.


Press the  key and all stored memory address channel numbers are displayed. Press the desired channel address number set key ( ~ ). The preset frequency and the channel number are displayed. When the TX-OFFSET Switch is placed in the "M" position, the frequency memorized in channel "0" is transmitted simply by pressing the PTT switch. In the case of no entered frequency, the display will indicate 5000 (145.000 MHz). To erase memory, press    then the channel address number to be erased. A "Beep" will sound. The erased channel number will display.

(Memory Scan) Key:

By pressing this key, scan operation starts at a speed of 1 channel per second and stops at a channel where signal is present. The scan resumes after 2 seconds after the incoming signal disappears. Press the  key to resume scan while stopped on a signal.




(UP/SCAN. W) Key:

By pressing the UP key, the frequency on the display shifts up 1 step (5 kHz). When this key is kept depressed for more than 1 second, the frequency is manually scanned. The radio will not stop on a signal-you must stop. If you overshoot, back up with the alternate key. This is also used with the  key to set the scan width and scan step for program scan operation. The scan step must be 5 kHz or more, in 5 kHz step increments (ie. 5,10... 25,30 kHz).



(DOWN/PROG. S) Key:

By pressing the DOWN key, the displayed frequency shifts down one 5 kHz step. When this key is kept depressed for more than 1 second, the frequency is scanned. This is a MANUAL scan. The radio will not stop on a signal- you must stop. If you over-

shoot, back up with the alternate key. This key is also used with the  key for program scan operation. Scan width and scan step must first be preset. During transmit, all 16 keys are automatically a tone pad.

17. Speaker

Miniature speaker for personal listening.

18. Microphone

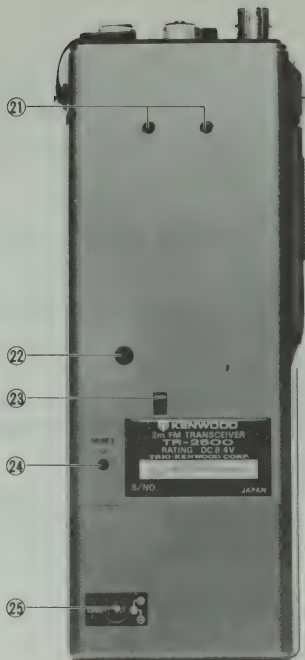
An electret condenser mic. Maintain 4 ~ 10 cm distance to the mic.

19. RELEASE Button

Used to release the battery case for removal. Depress this button, and slide the battery case to the left.

20. Battery Case

Contains seven Ni-Cd rechargeable batteries. Refer to page 5 for charging.



21. Belt-clip attachment point

To secure an optional belt-clip BH-2.

22. Sub-tone Frequency Adjustment

Used to adjust the built-in sub-tone frequency with the supplied alignment tool. The sub-tone frequency is factory preset to 100 Hz.

23. Sub-tone Selector Switch

This switch is used to select between the internal and an optional external subtone generator TU-1. (Up position: internal, Down position: external)

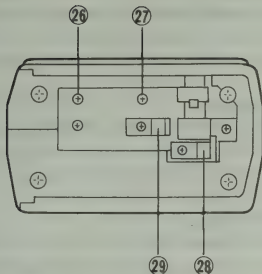
A dip-switch programmable sub-tone generator is available as an optional accessory. This installs between the TR-2500 and the battery case.

24. Reset Switch

Used to reset the microcomputer when replacing the backup lithium battery.

25. Charge Terminal

For charging the battery using the supplied AC charger. During charge DC power to the TR-2500 is automatically open (radio goes off).



26. TO (Sub-tone input) Terminal

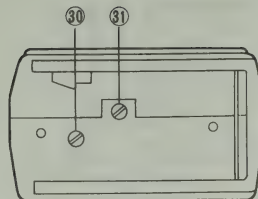
This terminal is used when the optional programmable tone unit (TU-1) is installed.

27. TOB Terminal

5 V DC appears on this terminal during transmission. This is used when the optional accessory tone unit TU-1 is installed.

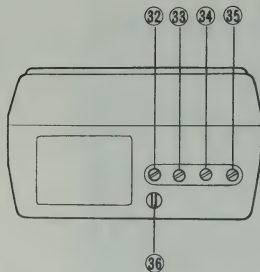
28. Battery ⊕ Terminal

29. Battery ⊖ Terminal



30. ⊕ Terminal of Ni-Cd battery

31. ⊖ Terminal of Ni-Cd battery



32. Ground Terminal

This is used as a ground terminal when charging from the optional accessory mobile stand or base stand.

33. DC Terminal

8.4 V DC independent of charging power is supplied to the TR-2500 through this terminal from the optional accessory mobile stand MS-1 or base stand ST-2.

34. Sensor Terminal

When charged from the optional accessory mobile stand MS-1 or base stand ST-2, the battery charged voltage is detected through this terminal.

35. Charge Terminal

The battery pack is charged through this terminal from the optional accessory mobile stand MS-1 or base stand ST-2.

36. Micro Switch

This switch serves to open the line feeding DC power from the batteries to the TR-2500 when the transceiver is charged from the optional accessory mobile stand MS-1 or base stand ST-2.

Section 3 KEY BOARD OPERATION

The TR-2500 employs a 16-key channel selection system. These instructions cover the basic operation of the key board.

It is also advisable to refer to Section 4 "OPERATION".

CHANNEL SELECTION

Frequencies are entered in 4 digits, so 4 Set keys should be used. For example, when entering 146.940 MHz, press keys ^{M6}6 ^{M9}9 ^{M4}4 and ^{M0}0 in that order.

If the key setting is found to be incorrect after pressing 4 keys, press the correct keys once again. To correct the setting before all the 4 keys are pressed, press the ^{STOP}C key and then press the correct Set keys.

NOTE: If a new frequency is not completely entered, the transceiver will continue to operate on the previously retained frequency. Be certain to enter all 4 digits for a new frequency.

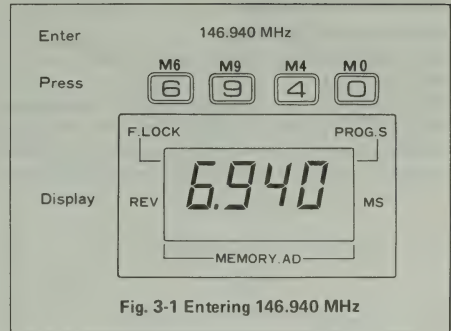






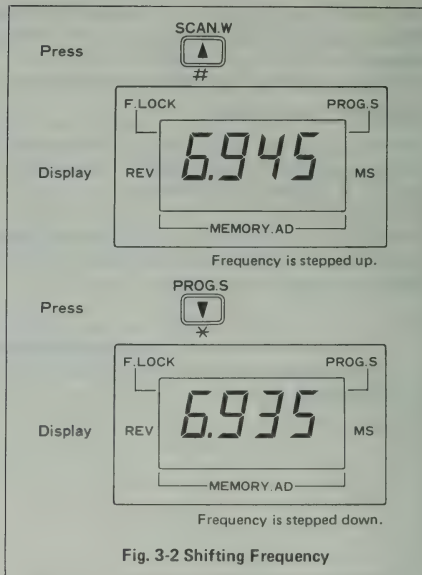
Fig. 3-1 Entering 146.940 MHz

SHIFTING FREQUENCY

To shift frequency, proceed:

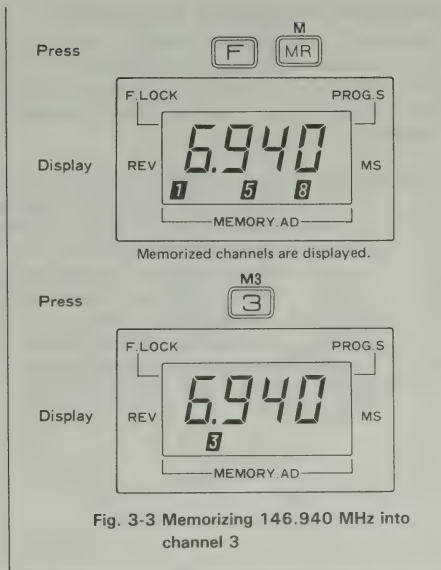
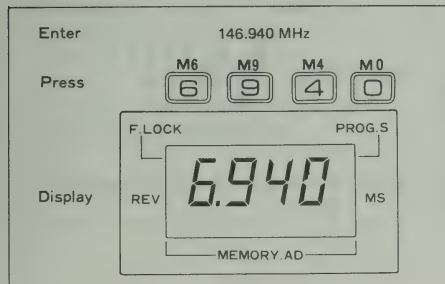
Press the Set keys as outlined previously, or press the  or  key.

The frequency shifts up or down by 5 kHz at each press of the  or  key; frequency is scanned when either key is kept depressed for more than 1 second. The scan is repeated between the 143.900 MHz and 148.995 MHz.











MEMORIZING FREQUENCY

First display the frequency to be memorized by pressing Set keys, then press the \boxed{F} \boxed{MR} keys. Memorized channels are displayed on the LCD. Empty channels will not display their memory address. They will be set at the preset frequency, 145.000 MHz. Next, press a Set key ($\boxed{M1}$ - $\boxed{M0}$) to select a storage channel. (See Fig. 3-3) A "beep" shows that the frequency is memorized in that channel. With the frequency "6940" displayed, press the \boxed{F} \boxed{MR} keys. Only memorized channel addresses are displayed on the LCD panel. Press the $\boxed{M3}$ key. A beep is heard and 146.940 MHz is memorized into channel 3. The frequency "6940" and memory address number 3 are displayed on the LCD panel.



RECALLING MEMORIZED FREQUENCY

Press the  key, and all memorized channel address numbers are displayed. Next, press a set key ( - ) for the desired channel. The frequency and channel number will be displayed, and a "beep" will sound, indicating this programming step is complete.

NOTE 1: When a frequency memorized in the O channel is recalled, it should be noted that the  key is interlocked with the TX-OFFSET switch. With the TX-OFFSET switch set in the "M" position, the frequency memorized in the O channel is transmitted by simply pressing the PTT switch, without having to press the  and  keys. Therefore, the O channel may be set up for a repeater split frequency other than ± 600 kHz. In all other TX-OFFSET switch positions, operating procedure for memory channels  -  is standard.

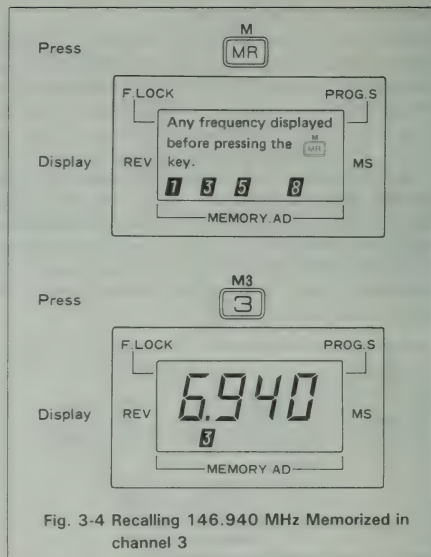


Fig. 3-4 Recalling 146.940 MHz Memorized in channel 3

ERASING MEMORY

To erase a memory, press **[F]**, **[M]**, **[MR]**, **[F]**, then the channel address number to be erased. A "beep" will sound. The erased channel number will display. More efficient memory scan operation may be enjoyed by erasing unwanted channels. The TR-2500 will scan only occupied channels. To clear all memories, use the reset feature on the rear panel.

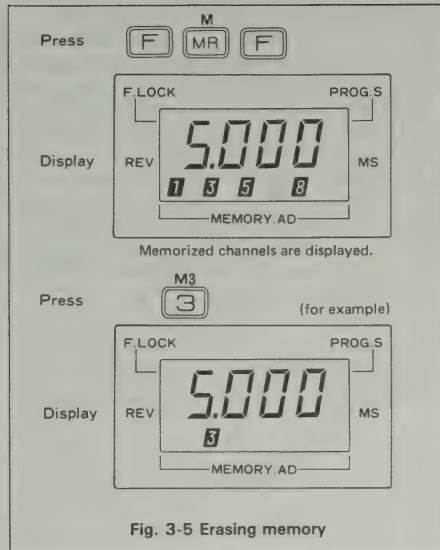
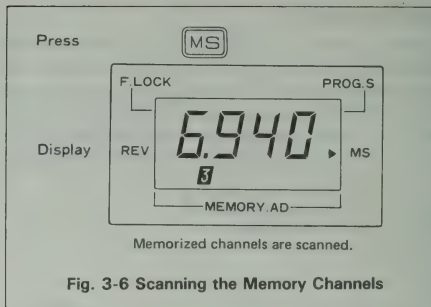


Fig. 3-5 Erasing memory

SCANNING THE MEMORY CHANNELS

With the **MS** key pressed, only memorized channels are scanned. The channel (memory address) and frequency are displayed, and the MS indicator is ON. The frequencies are scanned at a fixed speed of 1 second per channel. Scan speed is NOT adjustable. By setting the SQUELCH control to the threshold level, scan stops at a channel where signal is present and resumes after 2 seconds after the signal goes off. If you wish to continue the scan while a signal is present, press the **MS** key. The scan is released when the **STOP** key is pressed. To resume scanning, press the **MS** key once again. Scan operation is also released when you transmit.



PROGRAM (BAND) SCAN

SETTING SCAN WIDTH AND SCAN STEP

To set the lower frequency limit:

1. Enter the low frequency by 4 set keys.
2. Press **F** **SCAN W** **▲** **■**.

To set the scan step:

1. Enter the next highest frequency with the desired channel spacing (5, 10....25, 30 kHz) by either the set keys or the **SCAN W** **▲** **■** button.
2. Press **F** **SCAN W** **▲** **■**.

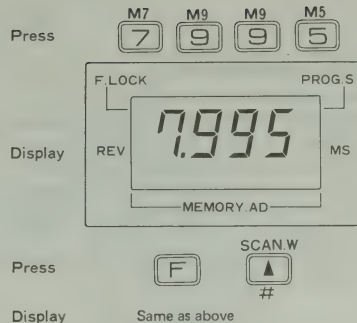
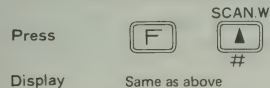
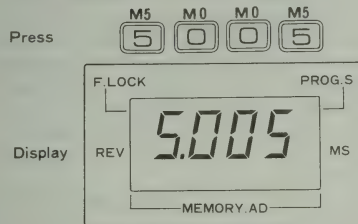
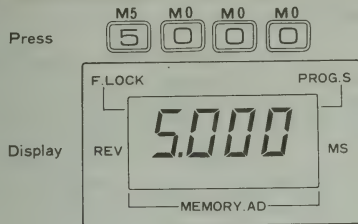


Fig. 3-7 Setting program scan

To set the upper frequency limit:

1. Enter the upper scan frequency by 4 set keys.
2. Press . A "beep" will sound indicating programming is complete.



Fig. 3-7 shows an example.




Lower frequency limit is 145.000 MHz.

Frequency step is 5 kHz.

Upper frequency limit is 147.995 MHz.

PROGRAM SCAN OPERATION

To operate program scan, press  .

By setting the SQUELCH control to the threshold level, scan stops at a channel where signal is present and resumes after 2 seconds after the signal goes off. If you wish to continue the scan while a signal is present, press the  key once again. The scan is released when the  key is pressed. To resume scanning, press the  key once again. Scan operation is also released when you transmit.

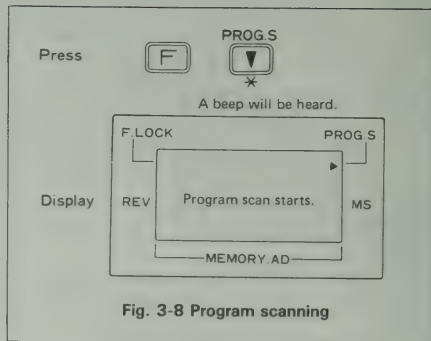






Fig. 3-8 Program scanning

Section 4 OPERATION

RECEPTION

1. Turn the power switch ON.
2. Turn the squelch control just past the threshold point.
3. Adjust the VOL control clockwise for desired audio output level.
4. Select the desired channel or frequency by using the Set keys ( - ),  and  keys, or by entering a frequency (refer to "Section 3 KEY BOARD OPERATION").

TRANSMISSION

1. Select the desired channel or frequency.
2. Set the TX-OFFSET switch to the appropriate position.
3. Select either Low Power (300 mW) or High Power (2.5 W).
4. Press the PTT switch and speak into the microphone. The ON AIR indicator will light. For optimum results, recommended distance to the microphone is 5-10 cm (2-4 inch).

TOUCH TONE KEYS

This is 16 button pad in Transmit mode.

During transmission, the key pad is automatically a Tone pad. Simply press any key, as needed.

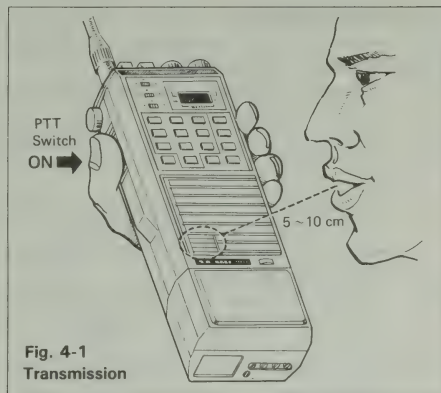


Fig. 4-1
Transmission

TX-OFFSET SWITCH

The TX-OFFSET switch, used for selecting simplex or repeater operation, has four positions.

- : Transmitter frequency is 600 kHz lower than the receive frequency.
- M: With the TX-OFFSET switch in the M position, the transmit frequency **only** is preset in memory channel 0.
(To preset the transmit frequency, refer to "MEMORIZING FREQUENCY" in Section 3).
This function allows the TR-2500 to operate any repeater frequency split.
- S: Your TR-2500 operates in the usual simplex mode. That is, receive and transmit frequencies are the same.
- +: Transmitter frequency is 600 kHz higher than the receive frequency.

S-TONE SWITCH

This switch activates the tone encoder. The TR-2500 has a built-in single-channel adjustable tone encoder. Frequency may be adjusted through the Rear-Panel opening using the supplied tuning tool. Frequency is preset to 100 Hz.

An optional Dip-switch programmable encoder TU-1 is also available: This slides between the transceiver and battery pack. When using a TU-1 move the Rear-Panel Tone Slide switch from the normal UP (internal) position to the external (DOWN) position.

GENERAL INFORMATION

Your TR-2500 has been factory aligned and tested to specifications before shipment. Under normal circumstances, the transceiver will operate in accordance with these operating instructions. If your transceiver fails to work, contact the Authorized KENWOOD Dealer from whom you purchased it for quick, reliable repair. All adjustable trimmers and coils in your transceiver were preset at the factory and should only be readjusted by a qualified technician with proper test equipment. Attempting service or alignment without factory authorization can void the transceiver's warranty.

ORDERING SPARE PARTS

When ordering replacement or spare parts for your equipment, be sure to specify the following:

Model and serial number of your transceiver, schematic number of the part, printed-circuit-board number on which the part is located, part number and name, if known, and quantity desired.

NOTE: A full Service Manual is available as a separate publication.

SERVICE

Should it ever become necessary to return the equipment for repair, pack in its original box and packing, and include.

1. Model and Serial number of the equipment.
2. A full, detailed description of the problems involved.
3. When claiming warranty service, please include a photocopy of the bill of sale, or other proof of purchase showing the date of sale.

You need not return accessory items unless they are directly related to the service problem.

▼ REAR VIEW

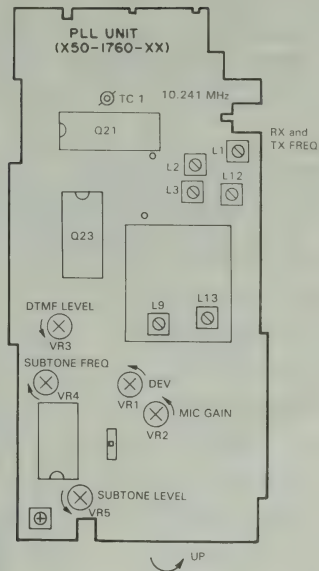
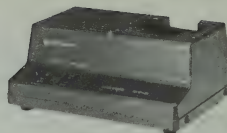


Fig. 5-1 Rear view

OPTIONAL ACCESSORIES

1. ST-2 Base Stand

- Built-in quick charger about 1.5 hours with full charge indicator.
- Full operation while charging.
Separate Battery Trickle charge and power feed for extended base operation.
- Drop-in connections.



ST-2



SMC-25

2. MS-1 Mobile Stand

- Cigar Plug for instant connection.
- Full operation while charging (trickle charge only)
Separate power feed for extended operation.
Built-in illumination for front keyboard.
- Drop-in connections.



MS-1



EP-1

3. PB-25 Ni-Cd Battery Pack



BH-2

4. SMC-25 Speaker Microphone

5. EP-1 Earphone

6. LH-2 Leather Case

7. BH-2 Belt Hook

8. WS-1 Hand Strap

9. TU-1 Programmable tone encoder.

10. VB-2530 RF Power Amplifier

11. BT-1 Manganese battery case



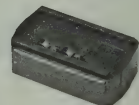
VB-2530



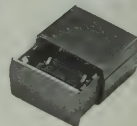
WS-1



PB-25

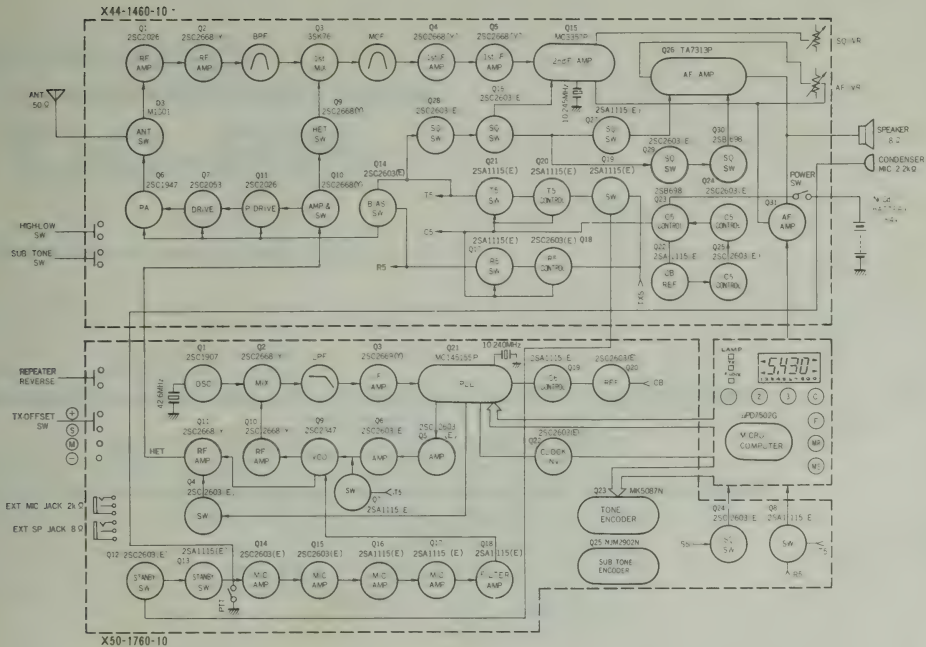


TU-1



BT-1

TR-2500 SCHEMATIC DIAGRAM



A product of
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